

THE OPERATION OF UNMANNED VESSEL IN LIGHT OF ARTICLE 94 OF THE LAW OF THE SEA CONVENTION: SEAMANING REQUIREMENT

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Abstract

Rapid technological changes in the shipping industry offer advantages and present serious challenges to maritime security and safety. This is how we should respond to the emerging development of unmanned vessels, all the more so because the existing international legal framework was not developed to accommodate their operation at sea. Similarly, the International Maritime Organization has taken this seriously by forming groups to assess such operations' compatibility with existing maritime conventions. One of the biggest challenges that unmanned vessels pose to the international legal framework concerns the sea manning requirement. This requirement is explicitly stipulated in the Law of the Sea Convention and elaborated in some conventions within International Maritime Organizations' purview. Against this backdrop, this article attempts to answer whether the unmanned vessels operation is in contravention of international law, particularly provisions on the sea manning element of a ship. To that end, this article will (i) elaborate on the flag state obligations in Article 94 of the Law of the Sea Convention, (ii) explain and identify the Generally Accepted International Rules and Procedures concerning sea manning, and (iii) describe the efforts of the International Maritime Organization in addressing this phenomenon.

Keywords : IMO, UNCLOS, unmanned vessel

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I. INTRODUCTION

Ship autonomy, as with any other technological advancements¹, might affects the existing international law of the sea. Over the past decade, the maritime industry has been witnessing a growing interest in the application of unmanned vessel or so-called maritime autonomous surface ships to operate alongside its counterpart manned vessel. Leading manufacturers in some countries have undertaken several trials on unmanned vessels operation at

¹ Technology advancement played a crucial role in the development of the territorial sea regime. New fishing technologies led coastal states to protect their waters from foreign fishing vessel operating near their shorelines, despite of the variety of state practice in determining the breadth of territorial sea. Having perceived as emerging state practice at that time, it significantly contributed to the codification of the territorial sea. (Donald Rothwell and Tim Stephens, *International Law of the Sea* (Hart Publishing, 2016), 61-62)

sea.² The newly emerging technology reportedly offers advantages in terms of insurance fee, human error elimination, safety at sea, and other financial considerations.³ Nevertheless, while it is yet to be decided on when the unmanned vessel will be feasible to undertake at-sea operation in the sense of technical and economic aspects⁴, some concerns have been raised about the legality of its future operation at sea, also its impact on navigational safety at sea.⁵

Much underlying issue concerns the absence of human (both master and crew) on board the unmanned vessel while traversing at sea. According to the International Maritime Organization (hereafter IMO), the level of ship autonomy varies from ship with automated processes and decision support to fully autonomous.⁶ In the first and second level of autonomy, seafarers are still on board the vessel with limited functions. Seafarers are no longer on board when the ship is in the third or four levels of autonomy. For this article's purpose, only the latter groups, where vessels are controlled remotely and neither master nor crew on board, will be discussed.

Sea manning of a vessel indeed holds a vital position within the international law of the sea. It is stipulated as one of the flag state obligations in Article 94 of the Law of the Sea Convention (hereafter Convention). In particular, Article 94, para (3) provides that:

“Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea with regard, inter alia, to:

(a) the construction, equipment and seaworthiness of ships;

(b) the manning of ships, labour conditions and the training of crews, taking into account the applicable international instruments;

(c) the use of signals, the maintenance of communications and the prevention of collisions.”⁷

Under international law, the State's failure to fulfill its international obligation entails the State's international responsibility if the breach is attributable to the State concerned.⁸ The focus of this article is directed to the second element of state responsibility, which is the breach of an international obligation. To determine the existence of such a breach, a careful examination of the sea manning requirement of a vessel as an international obligation needs to be carried out. To that end, this article elaborates on Article 94 of the Convention and relevant international regulations when analyzing the unmanned vessel

⁷ Convention on the Law of the Sea (entered into force 1 November 1994) 1833 UNTS 397 (UNCLOS), Article 94 paragraph (3).

⁸ Articles on the Responsibility of States for Internationally Wrongful Act, Article 1 and 2. These provisions reflect customary international law, thus binding to all states. See *Case concerning Rainbow Warrior Affair (New Zealand/France)*, ICJ 1986, para 75.

operation.

The Convention provides an overarching legal framework for virtually all kinds of uses of the ocean.⁹ Of course, that includes vessels and vessels' operation at sea. Even though the Convention addresses neither characteristic nor definition of 'vessel' or 'ship', it laid out basic rules for vessel's navigation in accordance with the zonal approach configuration.¹⁰ In this respect, a vessel needs to comply with rules enacted by coastal states while traversing the latter's maritime zones as well as those enacted by its flag state in all maritime zones. While there are also specific and pertinent provisions related to vessel-sourced pollution, this article only discusses sea manning provisions concerning flag states obligations.

Basic provisions on the flag state obligations over its vessels are located in Part VII on High Seas of the Convention, namely Article 91, 92, and 94. All of them need to be read together to get a solid understanding of flag state obligations. In a legal sense, article 91 provides that allowing a vessel to fly its flag equals granting nationality to the vessel concerned.¹¹ Article 92 further elaborates that this vessel is thereby subject to the exclusive jurisdiction of the flag state on the high seas.¹² The same rule applies in the Exclusive Economic Zone¹³, while concurrent jurisdiction might take place in other maritime zones subject to other provisions of the Convention.¹⁴ In complementing Article 91 and Article 92, Article 94 sets out a list of duties or obligations for flag states connected with vessels flying their flag, one of which is sea manning.

That being said, the Convention as a framework treaty does not address all elements of a vessel and explicitly refers to technical and more specific

⁹ Law of the Sea Convention is the most comprehensive treaty that governs the peaceful uses of the sea, thereby making it as an excellent point of reference in examining all kind of activities taking place at sea. Further, due to the number of its State Parties, most States are bound to the Convention. Most of the provisions also reflect the rule of customary international law, which indicates the legally binding force of those provisions to all States, including non-State Parties. See James Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (Cambridge University Press, 2011), 50-53.

¹⁰ The 'zonal approach' term used by the author is taken from Yoshifumi Tanaka. Read: Yoshifumi Tanaka, *The International Law of the Sea* (Cambridge University Press 2012), 4. 'Rules in the context of zonal approach configuration' refers to provisions in Article 19, Article 21 para (4), Article 39, and Article 52 of UNCLOS.

¹¹ *Ibid.*, Article 91.

¹² *Ibid.*, Article 92 para (1).

¹³ *Ibid.*, Article 58.

¹⁴ *Ibid.*, Article 21, 27 and 28, Article 42, Article 54. See "Article 92 Status of Ships" in *United Nations Convention on the Law of the Sea 1982: A Commentary Volume III*, Satya N. Nandan and Shabtai Rosenne, eds. (Martinus Nijhoff Publishers 1995), 126.

matters to be governed under other international regulations or instruments.¹⁵ This innovative regulatory technique is frequently used in the Convention, including in Article 94 of the LOSC, in which the sea manning requirement of a vessel is provided. As a result, identifying and assessing other relevant international regulations will be of paramount importance to answer the following research question: *Does an operation of the unmanned vessel where no human crew is on board violate the sea manning requirement of a vessel under international law?*

In answering this question, this article will be comprised of five parts. After the introduction, it examines the Convention. In particular, it elaborates the obligation of flag states relating to sea manning, stipulated in Article 94 of the Convention. The following section identifies which international instruments fall within the scope of ‘generally applicable international regulations, standards, and procedures. The discussion in this section would include specific considerations on how the manning element is regulated in those instruments as well as domestic laws of the United Kingdom, United States of America, Singapore, and Indonesia. The last two sections of this article shall be about the on-going attempt within the international community to address the application of unmanned vessel and the conclusion.

II. FLAG STATE OBLIGATIONS UNDER ARTICLE 94 OF THE CONVENTION

Article 94 of the Convention begins with the basic obligation of the flag state to ‘effectively exercise its jurisdiction and control in administrative, technical, and social matters over ships flying its flag’.¹⁶ It has been discussed that Article 94 para (1) is closely related to Article 91. As a matter of fact, both articles are provided in the same Article¹⁷ within the 1958 Convention on the High Seas. The last Article was originally intended by the Second Committee at UNCLOS I to strengthen the genuine link of a vessel.¹⁸ The International Tribunal reinforces the link between effective exercise of jurisdiction and control and genuine link for the Law of the Sea (ITLOS) in the case of *M/V*

¹⁵ LOSC, Article 94 para (5).

¹⁶ *Ibid.*, Article 94 para (1).

¹⁷ Convention on the High Seas (concluded 29 April 1958, entered into force 30 September 1962) 450 UNTS 11 Article 5 para (1).

¹⁸ Satya N. Nandan and Shabtai Rosenne, *United Nations Convention on the Law of the Sea 1982: A Commentary Volume III*, 114.

*Saiga*¹⁹ and *Virginia G.*²⁰ As the Tribunal put it, the purpose of this link is not to question the validity of ship registration, instead of ensuring more effective implementation of flag states' duty.²¹ That said, the meaning and scope of application of genuine link are yet to be agreed.

Although obligations provided in Article 94 of the Convention apply in all maritime zones²², this Article is located within the High Seas Part (Part VII of the Convention). It can be argued that an emphasis was given toward the implementation of flag states duty in the high seas because of the legal status of this maritime zone. High seas is not subject to state sovereignty²³ but, at the same time, open to all states²⁴. Therefore, concerns were rightly expressed about the maintenance of public order on the high seas. To address such concerns, every flag state is given exclusive jurisdiction and conferred obligations over its vessels on the high seas.²⁵

Flag state obligations in Article 94 of the Convention encompass all administrative, technical, and social matters. While the implementation of flag state duty falls within their discretion, this obligation cannot be taken lightly by flag states because it cannot fall below the standard of other international regulations concerned, as will be discussed later. The following paragraphs of this article would help ascertain specific obligations that flag states have under the Convention. With respect to the scope of this article, further discussion is limited to sea manning related duties provided in Article 94 para (2) (b), Article 94 para (3) sub-para (b)(c), Article 94 para (4) sub-para (b)(c), and Article 94 para (5).

One of a flag state's specific obligations is to "assume jurisdiction under its internal law over each ship flying its flag and over its master, officers, and crew".²⁶ Moreover, according to Article 94 para (3) sub-para (b), for the purposes of safety at sea, States are obliged to take necessary measure "with regard to the manning of ships, labour conditions and the training of crews, taking into account the applicable international instruments". To elaborate, paragraph 4 provides that the measures relate to the master and officers' quali-

¹⁹ *The M/V "Saiga" (No. 2) Case (Saint Vincent and the Grenadines/Guinea)* (1999), ITLOS, para. 81.

²⁰ *The M/V "Virginia G" Case (Panama/Guinea-Bissau)* (2014), ITLOS para. 113.

²¹ *M/V Saiga*, para. 83.

²² *South China Sea Arbitration Award* (Philippines/China) (2016), PCA, para. 944, 1060.

²³ LOSC, Art. 89.

²⁴ *Ibid.*, Art. 87.

²⁵ Douglas Guilfoyle, "Article 92 Status of Ships," in *United Nations Convention on the Law of the Sea: A Commentary*, Alexander Proelss, ed., (Munich: Verlag C. H. Beck oHG, 2017), 701.

²⁶ UNCLOS, Article 94 para (2) (b).

fication, number²⁷, and obligation in ‘observing the applicable international regulations’ concerning matters under sub-para (c). Both paragraphs also need to be read alongside paragraph (5), which provides that:

In taking the measures called for in paragraphs 3 and 4, each State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.²⁸

Article 94 para (5) obliges flag states to comply with generally accepted international regulations, procedures, and practices (hereinafter ‘GAIRP’) in carrying out their obligations. The International Law Commissions describes GAIRP as ‘products of international cooperation’ with the broad acceptance of states, regardless of its legal form.²⁹

Before proceeding with the discussion on GAIRP, it can be argued that the Convention indicate vessels to be manned, as evidenced in the wording of provisions in Article 94 para (3) and (4). Nevertheless, one might justifiably argue otherwise since the definition of ‘vessel’ or ‘ship’ is not provided in Article 1 of the Convention, nor vessel under the Convention is explicitly limited to the manned vessel. So far, there has been no international court decisions addressing this sea manning provision, leaving the aforementioned contradicting opinions in a stalemate position. The answer, however, can be found elsewhere. By establishing the rule of reference in Article 94 para (5), the Convention relies on other international instruments for all technical matters, including sea manning of a ship.

III. GENERALLY ACCEPTED INTERNATIONAL REGULATIONS, PROCEDURES, AND PRACTICES

Generally accepted international regulations, procedures, and practices, as referred by Article 94 para (5) of the Convention, would be identified and explained within this section. The International Law Commission opined that any instrument resulted from international cooperation can be classified as GAIRP as far as states broadly accept it.³⁰ Likewise, the International Law Association also recognizes state practices pertaining to these rules as the central element of the GAIRP expression.³¹ By virtue of Article 94 para (5), once an

²⁷ *Ibid.*, Article 94 para 4 (b)

³⁰ *Ibid.*

³¹ Committee on Coastal State Jurisdiction Relating to Marine Pollution, “First Report,” in *International Law Association Report of the Sixty-Seventh Conference* (London: International Law Association, 1996), 176.

instrument is crystallized into GAIRP, it becomes binding to all LOSC member states, even if they are non-Contracting Parties to the respective instrument. This way, GAIRP is comparable to customary international law.

Some legal scholars even consider GAIRP as rules of customary international law.³² Others disagree with that conclusion, saying that it would not be necessary to require states to comply with GAIRP if they were regarded as customary international law. To add, there are doubts as to whether international products dealing with very technical matters may be regarded as customary international law.³³ To the author, it is more convincing to say that GAIRP is *sui generis* rather than being equivalent to customary international law.

The use of GAIRP or rule of reference technique would help the Convention adapt to rapid technology changes. That is the Convention delegates technical matter to other relevant international organizations. Most relevant to this issue is IMO. Therefore, the International Labor Organization's instruments are disregarded in this article because the absence of human on board in the operation of unmanned vessels certainly does not concern labour or human rights issues at sea. It is up to the IMO to decide how the sea manning requirements are/are to be understood.

The rule of reference provided in this Article 94 para 5 of the Convention refers to all of the following IMO treaties, on account of worldwide acceptance, namely³⁴:

- 1) International Convention for the Safety of Life at Sea 1974 (SOLAS 1974) – 165 Contracting States (in terms of Gross Tonnage, 99.04% of the world's merchant fleet)³⁵;
- 2) Protocol of 1988 relating to the International Convention for the Safety of Life at Sea (SOLAS Protocol 1988) – 120 Contracting States (in terms of Gross Tonnage, 97.89% of the world's merchant fleet)³⁶;
- 3) International Convention on Load Lines 1966 (Load Lines 1966) – 162 Contracting States (in terms of Gross Tonnage, 99.18% of the

³² "Article 211," in *United Nations Convention on the Law of the Sea: A Commentary*, Alexander Proelss, ed., (Munich: Verlag C. H. Beck oHG, 2017), 1435.

³³ Bernard H. Oxman, "The Duty to Respect Generally Accepted International Regulations," *New York University Journal of International Law and Politics* 24, (1991): 146-147.

³⁴ Secretariat of the International Maritime Organization, *Implication of the United Nations Convention on the Law of the Sea for the International Maritime Organization: Study by the Secretariat of the International Maritime Organization* (2014), 15.

³⁵ International Maritime Organization, *Status of IMO Treaties*, 24 September 2019, 17.

³⁶ *Ibid.*, 86.

world's merchant fleet)³⁷;

- 4) Protocol of 1988 relating to the International Convention on Load Lines (Load Lines Protocol 1988) – 115 Contracting States (in terms of Gross Tonnage, 97.81% of the world's merchant fleet)³⁸;
- 5) International Convention on Tonnage Measurement of Ships 1969 (TONNAGE 1969) – 157 Contracting States (in terms of Gross Tonnage, 99.09% of the world's merchant fleet)³⁹ ;
- 6) Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREG 1972) – 160 Contracting States (in terms of Gross Tonnage, 99.03% of the world's merchant fleet)⁴⁰;
- 7) International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers 1979 (STCW 1978) – 165 Contracting States (in terms of Gross Tonnage, 99.03% of the world's merchant fleet)⁴¹; and
- 8) International Convention on Maritime Search and Rescue (SAR 1979) – 113 Contracting States⁴².

It must be taken into account that all regulations mentioned, only COLREG 1972, SOLAS 1974, and STCW 1978, address the sea manning element and/or requirement of a vessel.⁴³ With this in mind, the following discussions shall be limited to these three instruments considering the scope of this essay. While there might be other international instruments not mentioned in this essay, COLREG 1972, SOLAS 1974, and STCW 1978 should be adequate in providing an overview of the aspect of sea manning in the maritime regulatory framework.

A. RELEVANT INTERNATIONAL INSTRUMENTS

Having identified the relevant GAIRP in our discussion (COLREG 1972, SOLAS 1974, and STCW 1978), this article attempts to analyze the sea manning requirement in each instrument. To enrich the discussion, scholarly opinions are also presented in this section. There are two possible answers from

³⁷ *Ibid.*, 205.

³⁸ *Ibid.*, 223.

³⁹ *Ibid.*, 232.

⁴⁰ *Ibid.*, 98.

⁴¹ *Ibid.*, 412.

⁴² *Ibid.*, 429.

⁴³ In this respect, the Secretariat of the IMO only mentions about SOLAS and STCW as related instruments, but the author agrees with other scholars, such as Michael R. Benjamin and Joseph A. Curcio, Robert Veal, and Professor Hooydonk to include COLREG in the list. *Read International Maritime Organization* (2014), 27.

this assessment. The operation of unmanned vessels is either (i) in contravention to the sea manning requirements or (ii) compatible with the sea manning requirements subject to interpretations.

COLREG 1972 provides several guidelines or rules in order to prevent collisions between vessels on the high seas and all waters connected to the high seas and navigable by seagoing vessels.⁴⁴ In general, the instrument is comprised of five (5) parts, namely general provisions, steering and sailing rules, lights and shapes, sound and light signal rules, and exemptions. First and foremost, COLREG 1972 provides a non-exhaustive definition of the ship, as follows:

*“...every description of watercraft, including non-displacement craft, WIG craft and seaplanes, used or capable of being used as a means of transportation on water.”*⁴⁵

Given the broad definition above, unmanned vessels certainly fall within the scope of the vessel. Regarding other maritime law instruments, both at international and domestic levels, that define a ship/vessel, Hooydonk argues that the essential part of a ship generally is not about having a crew on board, including a master'.⁴⁶ Instead, it is about whether the ship moves through the water.⁴⁷ This opinion is also shared by another prominent maritime scholar, James Kraska.⁴⁸ Therefore, to Hooydonk and Kraska, an unmanned vessel may be considered as a vessel. This way, unmanned vessels will be subject to existing regulations, including COLREG 1972.

Nevertheless, the element of physical sea manning is implicitly found several times within this instrument. For instance, Rule 2 concerns the duty of the master or crew to comply with the rules provided within the instrument or ‘any precaution that the ordinary practice may require of seamen’ or ‘the special circumstances of the case’.⁴⁹ In doing so, ‘due regard shall be had to all dangers of navigation and collision and to any special circumstances’.⁵⁰ The duty reflects the general standard of good seamanship that is entitled to masters and crews. It is doubtful whether the standard of good seamanship may be

⁴⁴ Convention on the International Regulations for Preventing Collisions at Sea (concluded 20 October 1972, entered into force 15 July 1977) 1050 UNTS 16 (COLREG), Rule 1 (a).

⁴⁵ *Ibid.*, Rule 3 (a).

⁴⁶ Eric van Hooydonk, “The Law of Unmanned Merchant Shipping: An Exploration,” *Journal of International Maritime Law* 20, (2014): 407-409.

⁴⁷ *Ibid.*

⁴⁸ James Kraska, “The Law of Unmanned Naval Systems in War and Peace,” *Journal of Ocean and Technology*, (2010): 53.

⁴⁹ COLREG, Rule 2 (a).

⁵⁰ *Ibid.*, Rule 2 (b).

preserved in the unmanned vessel operation.

Hooydonk argues that rules within COLREG 1972 do not truly matter to unmanned vessel operation because the real-world scenario technology enables the on-shore operator or remote controller to respond in the same way as the master on the bridge. This is also evidenced in the modern manned ship.⁵¹ In contrast to this argument, there are rules on the proper lookout, lights and day shapes, safe speed, and making way set out by the COLREG 1972 that is conceived as difficult to be carried out without human real-time assessment and experience on board.⁵² In this respect, the applicability of COLREG 1972 in unmanned vessels will arguably be subject to state interpretation until a consensus is reached amongst the states or clarification from the IMO is issued.

Unlike COLREG 1972, SOLAS 1984 and STCW 1978 explicitly laid out several rules on a ship's sea manning element, though no definition of ship or vessel is provided within both regulations. SOLAS 1984 was established to promote the safety of life at sea by specifying minimum standards for ships' construction, equipment, and operation. It consists of articles setting out general obligations, amendment procedures, and 14 chapters of Annex.⁵³ Regarding sea manning, according to Regulation 13 in Chapter V on Safety of Navigation, all contracting states are obliged to maintain or adopt the measure in ensuring all ships flying their flag 'sufficiently and efficiently manned'.⁵⁴ In other words, the content of such measures is indeed within the discretion of the flag state, but the criterion of 'sufficiently and efficiently manned' needs to be assessed.

Drawing on the above criterion, the author believes that zero number of humans on board a vessel is not intended by SOLAS 1974. This is also supported by the fact that while the automatic pilot is allowed within the navigation, a specific rule on manual steering under Regulation 19 requires human

⁵¹ Eric van Hooydonk, "The Law of Unmanned Merchant Shipping: An Exploration," 41. This statement is similar with the claim of Rolls Royce on its unmanned vessel trial, *read* "Maritime Executive News, Autonomous Ships can Use COLREGs Effectively," accessed 7 October 2019, <https://www.maritime-executive.com/article/autonomous-ships-can-use-colreg-rules-effectively>.

⁵² Michael R. Benjamin and Joseph A. Curcio, "COLREGs-Based Navigation of Autonomous Marine Vehicles," *IEEE/OES Autonomous Underwater Vehicles*, (2004): 34-36.

⁵³ "International Convention for the Safety of Life at Sea (SOLAS) 1974," International Maritime Organization, accessed 7 October 2019, [http://www.imo.org/en/about/conventions/listof-conventions/pages/international-convention-for-the-safety-of-life-at-sea-\(solas\)-1974.aspx](http://www.imo.org/en/about/conventions/listof-conventions/pages/international-convention-for-the-safety-of-life-at-sea-(solas)-1974.aspx).

⁵⁴ International Convention for the Safety of Life at Sea (concluded 1 November 1974, entered into force 25 May 1980) 1184 UNTS 2 (SOLAS), Chapter V, Regulation 13 Manning.

officer or crew to be physically on board.⁵⁵ What is more, SOLAS 1974 explicitly obliges the master of the vessel to assist or rescue people in distress at sea, which seems unlikely to be done without human on board.⁵⁶ That is not to say that future technological developments might enable the unmanned ship's remote controller to carry out this obligation.

The IMO has adopted the principles of minimum sea manning to provide a framework for administrations to determine the safe manning of ships. In its Guidelines, the IMO never allowed a vessel operating without an officer on board, even though the level of automation, shore supports, and other factors may reduce the crew number on a ship.⁵⁷ Veal *et al.* also acknowledged this interpretation. However, they reached a different conclusion from the author by considering that zero number of crew onboard an issue if the national administration determines that alternative communication arrangement and equipment have met the safety requirement.⁵⁸

Lastly, STCW 1978 lays out basic and minimum requirements on training, certification and watchkeeping for seafarers on an international level. It is established to 'promote the safety of life at sea and property at sea and the protection of marine environment'.⁵⁹ This instrument is correlated with Article 94 para (4) of the Convention, which sets a higher threshold to flag states obligation by requiring master and officer on board a vessel to hold a certain qualification. Under Article III of SCTW 1978, this instrument applies only to seafarers serving onboard seagoing ships, with the exception provided to warship or government vessel operated for non-commercial purposes, fishing vessels, pleasure yacht not engaged in trade, and wooden ships of the primitive build.⁶⁰ Put differently, STCW 1978, being the uniform and global standard of training and certification for seafarer as referred by Article 94, excludes shore-based personnel or controller from its application.

As a result, not only unmanned vessel operation is not in accordance with STCW; its remote controller also cannot use the current STCW-based certificate for that specific operation. In this respect, Veal *et al.* further argues that the absence of an internationally uniform standard for qualification and

⁵⁵ *Ibid.*, Regulation 19 Use of the Automatic Pilot.

⁵⁶ Natalie Klein, *et. al.*, "Maritime Autonomous Vehicles: New Frontiers in the Law of the Sea," *International & Comparative Law Quarterly* 69 (2020): 728.

⁵⁷ IMO Resolution A. 1047 (27), Principles of Minimum Safe Manning, Annex 2 Article 1.1

⁵⁸ Robert Veal, Michael Tsimplis, and Andrew Serdy, "The Legal Status and Operation of Unmanned Maritime Vehicles," *Ocean Development & International Law* 50, no.1 (2019): 37-38.

⁵⁹ International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (concluded 7 July 1978, entered into force 28 April 1984) 1361 UNTS 2 (STCW) Preamble.

⁶⁰ *Ibid.*, Article III.

training for shore-based personnel will leave a legal void to unmanned vessel operation in the sense of seaman certification provided in Article 94 para (4). Since the main issue of sea manning in STCW 1978 has been addressed, it is no longer relevant to identify and further elaborate other pertinent provisions in this instrument.

The above assessment on COLREGs 1972, SOLAS 1974, and STCW 1979 found that the existing international legal frameworks are developed and intended for manned ships. This understanding explains why the Convention included specific provisions on sea manning of a ship. It bears noting that the three instruments had been adopted years before the Convention adopted. The author believes that SOLAS 1974 and STCW 1979 need to be amended to accommodate unmanned ship operation. While COLREGs 1972 may be interpreted in a way to accommodate this operation, there must be clarity from the IMO about this. Indeed, there have been discussions within the IMO to address unmanned vessels' development, which will be explained in the following chapter. The discussion now proceeds to the domestication of those instruments, especially regarding the sea manning requirements.

B. DOMESTIC LAWS

This brief section is intended to give readers an overview of sea manning requirement within the domestic legal framework of the United Kingdom, United States, Singapore, and Indonesia. All of them are signatories to COLREG 1972, SOLAS 1974, and SCTW 1978. They basically require a crew/officer or master to be on board every ship flying their flags. However, provided that some of the provisions do not explicitly state this rule, similar confusions appear to be present at the domestic level regarding whether the unmanned vessel operations contravene sea manning requirement.

Under the Merchant Shipping Act of the United Kingdom, a ship is defined broadly as including every description of vessel used in navigation.⁶¹ This way, the unmanned vessel may fit within this definition. In implementing Merchant Shipping Act, Regulations 46 (1) and (2) of Merchant Shipping Regulation 2015/782 oblige the owner and master of the ship to obtain sea manning documents first before going out to sea.⁶² When applying for this document, nothing in Regulation 46 (3) mentioned the minimum number of seafarers on board. The British Maritime Law Association interpreted this provision to give the UK authorities broad discretion in allowing zero number

⁶¹ Merchant Shipping Act 1995, Section 313 (1).

⁶² Merchant Shipping (Standards of Training, Certification and Watchkeeping) Regulations 2015/782, Regulation 43 (1) and (2).

of crews on board if the vessel may be operated this way safely.⁶³ There is a prohibition for a ship going to sea without carrying a sea manning document, which entails a different form of penalties to the company and master.⁶⁴

Furthermore, the British Maritime Law Association believes that the operation of unmanned vessels may be contrary to good seamanship. Regarding the SCTW 1978 requirements, the SCTW Code is clearly not applicable in unmanned vessels operation.⁶⁵ In practice, Prasetya explained that the Royal Navy and Navigation Safety Advisory Council of the United Kingdom considered unmanned vessels as conventional vessels. As a result, these vessels need to comply with existing domestic laws.⁶⁶ However, the question remains as to whether the unmanned vessel needs to be sufficiently crewed to satisfy *inter alia* Merchant Shipping Act provisions.

In implementing SOLAS 1974, the Singaporean Government requires an appropriate minimum safe manning for every vessel operation.⁶⁷ Administrative sanctions will be imposed on the vessel owner or master whenever this provision is being violated.⁶⁸ What is more, the Singaporean Maritime Law Association believes that COLREGs was not intended for the operations of unmanned vessels. Good seamanship and proper lookout are among the considerations that the Association have before coming to that conclusion.⁶⁹ Regarding SCTW 1978, the existing scope of ‘seafarer’ is limited to people/crews serving on board. Thereby a new definition of the seafarer is required to accommodate the remote controller of unmanned vessels.⁷⁰

The word ‘vessel’ is also defined broadly in the United State Code, which arguably encompasses unmanned vessels. Comparable to COLREG 1972, the Title 1 US Code defines the vessel as follows.

“Vessel includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on

⁶³ British Maritime Law Association, CMI Questionnaire: Unmanned Vessels, para. 3. This can be accessed on: <https://comitemaritime.org/work/mass/>.

⁶⁴ See n64, Regulation 55 (2) and (3).

⁶⁵ See n65, paras. 4 and 5.

⁶⁶ Jeremia Humolong Prasetya Nainggolan, “Military Application of Unmanned Underwater Vehicles: In Quest of a New Legal Regime?” *Indonesian Journal of International Law* 16, no.1 (2018): 75.

⁶⁷ Singapore, Merchant Shipping (Safety Convention), Chapter V Regulation 14 (a).

⁶⁸ *Ibid.*, Chapter I Regulation 22.

⁶⁹ Singapore’s Response to CMI Questionnaire on Unmanned Ships, para. 4. This can be accessed on: <https://comitemaritime.org/work/mass/>.

⁷⁰ *Ibid.*, para. 5.

water.”⁷¹

Sea manning is considered in the Certificate of Inspection issued by the Coast Guard.⁷² Nothing was mentioned about the minimum number of crews on board here. However, the Coast Guard discretion is subject to other provisions set by the Congress, such as the requirement of three licensed mates and/or three licensed engineers in vessels of 100 GT above⁷³ and the minimum number of licensed crews in different types of vessels. The latter provision specifies the minimum number of crew on board according to its gross tonnage and voyage duration.⁷⁴ Arguably, the existence of crews on board is required. This is also supported by domestic jurisprudence.⁷⁵ There are also penalties imposed on the owner, charterer, or operator of vessels not manned in accordance with the United States Code on Shipping.⁷⁶

Regarding the proper lookout requirement in domestic law, the US Maritime Law Association held that sophisticated onboard technology could not replace the human lookout's role. They are open to a possibility where a sophisticated-on board technology would enable the remote controllers to engage in a real-time scenario.⁷⁷ They also suggested a revision of SCTW and federal US laws to accommodate the application of unmanned vessels in the SCTW, especially the watchkeeping requirements.⁷⁸

Another state which explicitly requires ship to be manned is Indonesia, as provided in Article 8 para (1) and Article 135 of the Shipping Law.⁷⁹ The latter provides that:

“Every ship must be manned by Crews that meet qualifications and competence requirements in accordance with national and international regulations.”

The Indonesian Government has set out the minimum number of crews onboard a vessel depending on its type and volume.⁸⁰ It bears noting that SO-

⁷¹ United States Code Title 1, Chapter I, Regulation 3.

⁷² *Ibid.*, Title 46, Part F Manning of Vessels, Regulation 8101.

⁷³ *Ibid.*, Regulation 8104.

⁷⁴ *Ibid.*, Regulation 8301.

⁷⁵ Response of MLA to CMI Questionnaire Re Unmanned Ships, para. 3 (1), accessed on <https://comitemaritime.org/work/mass/>.

⁷⁶ See n73, Regulation 8101.

⁷⁷ See n77, para. 4 (4).

⁷⁸ *Ibid.*, para. 5.

⁷⁹ Shipping Law, Law Number 17 of 2008 on Shipping, Article 8 para (1) and Article 135.

⁸⁰ Minister of Transportation Decree No. 70 of 1998 on Sea Manning of Merchant Ships, Art. 13-16.

LAS 1974 and SCTW 1978 are domesticated in Indonesia domestic law in a way that is requiring masters and crews/officers on board to carry out their roles.⁸¹

IV. IMO EFFORTS IN SECURING FUTURE OPERATIONS OF UNMANNED VESSEL

Having recognized the unmanned vessel's possible incompatibility within the existing regulatory framework, the discussion shall be followed by brief information on how the international community reacts to this phenomenon. As the specialized body of the United Nations with international shipping and safety navigation at sea, IMO, through its Maritime Safety Committee, so far have formed a group of states to voluntarily conduct the regulatory scoping exercise on Maritime Autonomous Surface Ships (MASS).⁸² On its 100th session of the meeting, the Maritime Safety Committee has decided to approve the framework and methodology used for the regulatory scoping task. A set of IMO treaties, especially COLREG 1972, SOLAS 1984, STCW 1978, is currently being assessed by the group, and the full assessment is expected to be completed in 2020.

Regulatory scoping exercise is carried out in two steps. The first step is identifying provisions in IMO instruments which (i) apply and prevent MASS operations, or (ii) apply to MASS and do not prevent MASS operations and require no actions; or (iii) apply to MASS and do not prevent MASS operations but may need to be amended or clarified, and/or may contain gaps; or (iv) have no application to MASS operations.⁸³ Upon completing the first step, the group will analyze and determine the most appropriate means in addressing MASS operations. These means can be equivalences or developing interpretation, and/or amending existing instruments, and/or developing new instruments, or any other means.⁸⁴ The assessment almost comes to an end as the participating states have submitted their analysis on MASS, along with comments from other member states. That being said, key discussion on MASS will be continued in MSC 103.⁸⁵

⁸¹ *Ibid.*, Art. 19.

⁸² "IMO Takes First Steps to Address Autonomous Ships," International Maritime Organization, accessed 7 October 2019, <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/08-MS-99-MASS-scoping.aspx>.

⁸³ Maritime Safety Committee of the International Maritime Organization, Report of the Maritime Safety Committee on Its One Hundredth Session, MSC 100/20/Add.1, Annex II, para. 9.

⁸⁴ *Ibid.*, para. 10.

⁸⁵ Maritime Safety Committee of the International Maritime Organization, Provisional Agenda for the 102nd session of the Maritime Safety Committee, MSC 102/1/Rev.1.

Even if these assessments find the unmanned vessel or MASS operation incompatible within the existing legal framework, the IMO's decision-making process will enable this organization to respond swiftly. That is to say, IMO can use the tacit acceptance procedure, which is incorporated in most IMO technical conventions, including SOLAS 1984 and SCTW 1978. Tacit acceptance procedure allows amendments to technical annexes to enter into force on a date provided in the Convention or selected by the Conference unless there is a specified number of objections from contracting states to those conventions within a period.⁸⁶ This way, IMO can undergo expeditious processes of the amendment and become dynamic to cope with rapid technological changes like automation in the maritime sector and various safety issues at sea.⁸⁷

In addition to amendments, IMO Member States also have the option to develop new instruments in addressing MASS operations, particularly those without human onboard. China suggests this in its assessment for SOLAS 1984. First, China pointed out many potential legal gaps or provisions in this instrument that need to be amended, for instance, definitions, role, qualifications, and responsibilities of seafarers. On such a large scale, Amending SOLAS are considered to be complicated, impractical, and detrimental to the effective implementation of SOLAS 1984 in the conventional (manned) vessels. By contrast, China suggested developing a separate and dedicated mandatory instrument to encompass all the necessary provisions regarding MASS operation.⁸⁸ Five-member states agreed with the analysis result of China.⁸⁹

V. CONCLUSION

While the research question raised in this article primarily concerns one of the provisions (Article 94) in the Convention, the Convention does not provide a specific and precise answer. It would not be adequate to determine whether the unmanned vessel can fit within the existing legal framework and meet the sea manning requirement by merely pointing out Article 94 para (3) (4). The author concludes because Article 94 (5) of the Convention explicitly says otherwise. Through the establishment of the rule of reference, this Article relies on other international regulations or so-called GAIRP to address the ele-

⁸⁶ Md Saiful Karim, *Prevention of Pollution of the Marine Environment from Vessels – The Potential and Limits of the International Maritime Organization* (Switzerland: Springer International Publishing, 2015), 36.

⁸⁷ Rosalie P. Balkin, "The IMO and Global Ocean Governance: Past, Present, and Future," in *The IMLI Treatise on Global Ocean Governance: Volume III: The IMO and Global Ocean Governance*, David J. Attard, et. al. eds. (Oxford University Press, 2018), 12-13.

⁸⁸ Maritime Safety Committee of the International Maritime Organization, Regulatory Scoping Exercise for the Use of Maritime Autonomous Surface Ships (MASS), MSC 102/5/9, para. 7.4.

⁸⁹ *Ibid.*, Annex, 2.

ment of sea manning extensively. Although flag states are granted discretion to exercise their duties provided in Article 94, such exercise cannot fall below the standard of GAIRP. In other words, the Convention obliges its State Parties to comply and/or give effect to GAIRP.

The GAIRP that are relevant to our discussion is SCTW 1978, SOLAS 1974, and COLREG 1972. Nevertheless, only SCTW 1978 and SOLAS 1984 provide explicitly the requirement of human (crew/officer/master) on board. What is more, in the case of SOLAS 1984, there are even legal scholars who argue otherwise, which indicate the need for further assessment on the compatibility of unmanned vessels within this convention. The outcome of IMO's on-going study, thus, will be significant in clarifying this question. Similar to the SOLAS 1984, COLREG 1972 does not explicitly exclude unmanned vessel from its application. However, some of its provisions arguably demand human assessment and experience onboard, regardless of the future existence of real-time monitor and other sophisticated features.

To sum up, the Convention, in conjunction with generally accepted international regulations, standards, and procedures, also domestic legislations of some states, do not accommodate the operation of unmanned vessels. In fact, the operation of those vessels tends to contravene sea manning provisions within those instruments. In the author's view, the operation of unmanned vessels can only comply with sea manning requirements under the law of the sea if amendments of at least STCW 1978 and SOLAS 1984 occur. On the one hand, allowing these vessels to navigate at sea will arguably be considered as not complying with the international obligation in Article 94 of the Convention. On the other hand, flag states concerned might also argue that its navigation operates in a legal void (a grey area) under international law, particularly on the sea manning requirement, instead of contravening their international legal obligation.

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